The Existence Of Planet Nine: Possible Locations and Effects of a Ninth Planet Beyond Neptune

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INTRODUCTION / ABSTRACT

In January 2015, Konstantin Batygin and Mike Brown, two astronomers from Caltech presented mathematical modeling and computer simulations that predict there is possibly an undiscovered planet in the outer solar system. This new object is being called, at this time. "*Planet X*". The possibility of this new planet within our solar system brings a few questions to mind. With Planet X being a possible part of our solar system, will it eventually be a threat to earth? If Planet X is a threat to earth, what possible harm could it cause? We will present the current information available on these hypothetical questions and possibly raise more questions for you to think about, come and visit our poster!

OBJECTIVES

The two objectives of this research is to conclude whether Planet Nine exists beyond Neptune, this is excluding Pluto as being labeled as a planet, and to determine its location to further conclude if its presence poses any possible harm to Earth.

METHODS

- Comparing and contrasting different studies regarding Planet Nine's existence
- Identify any correlation factors among studies regarding Planet Nine
- Verifying location techniques of Planet Nine among different studies
- Identify possible characteristics of Planet Nine that may cause future damage to Earth
- Verifying any methods of collecting data regarding TNO clusters

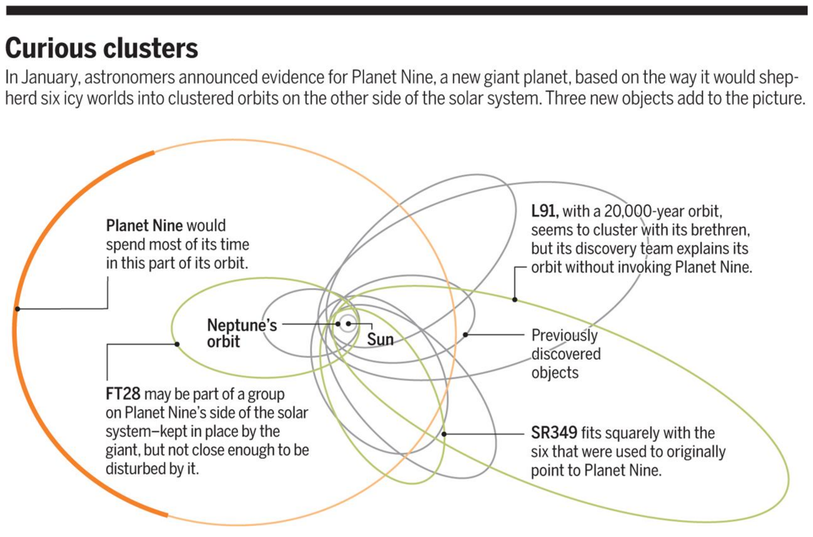

Figure 1. The first batch of Trans-Neptunian objects found with clusters (Mann, Adam).

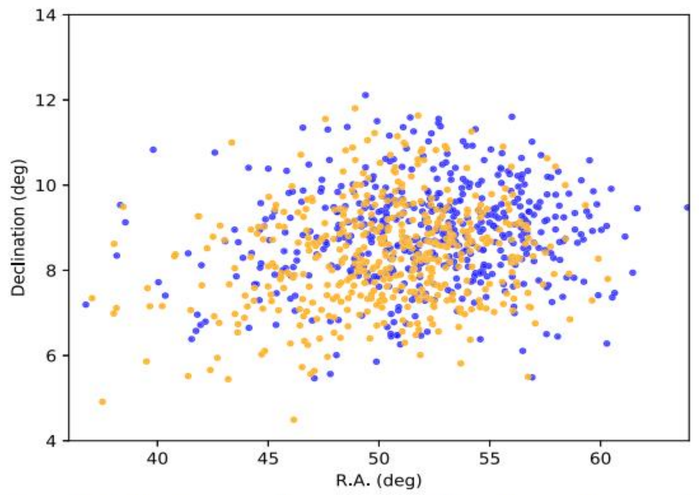

Figure 2. Distribution of simulation clones at 300 au. Orange dots: first 500 clones, with no atmospheric slowdown effect considered. Blue dots: remaining 500 clones with initial velocities augmented by a random factor between 1 and 1.1 (uniform distribution).

Figure 2. A Simulation of 1000 asteroid clones; x-axis indicates location and y-axis indicates inclination from ecliptic

RESULTS

- Initial findings found several Trans-Neptunian object clusters, all of which pointed towards the existence of Planet Nine
- Later studies claimed location bias and weather patterns caused the clustered observations
- Despite this, Multimessenger Astronomy pointed towards Planet Nine existing due to the meteoroid messenger, Center for Near Earth Object Studies 2014-01-08. The velocity with respect to the local standard of rest indicates it was flung by an intermediary body, and the inclination from ecliptic was around 7 degrees, which is abnormally low.
- However, meteoroid messenger properties may be caused from other large bodies, such as a passing star or a rouge planet
- Trajectory disturbances among extreme Trans-Neptunian objects found point to Planet Nine's mass possibly being around 4 to 8 times that of Earth and about 300-540 au from the Sun.

Acknowledgments

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CONCLUSIONS

Findings suggest that although various clusters of Trans-Neptunian objects and their properties suggest the presence of Planet Nine, these findings may be biased. However, the Center for Near Earth Object Studies 2014-01-08 meteoroid suggests that something must have interfered, causing a high velocity and low ecliptic inclination quantity to be observed. The presence of interference also suggests future interstellar asteroids may be affected, potentially being hazards in the future.

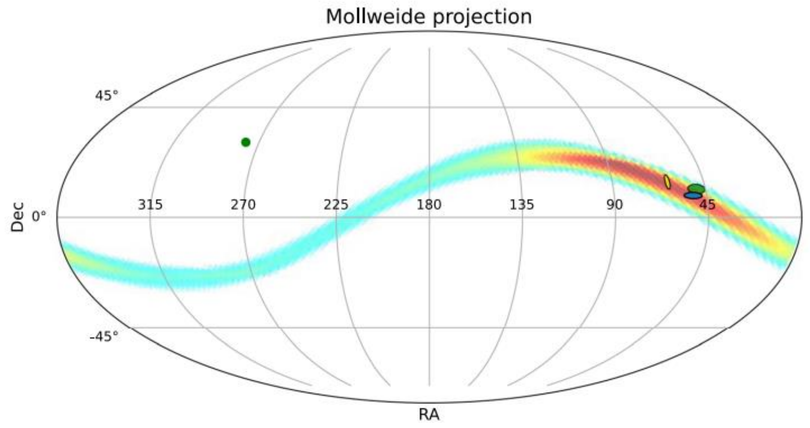

Figure 3. A diagram indicating the region Planet Nine may reside. Simulations indicated that CNEO 2014-01-08 falls in the Planet Nine region (Red)

FUTURE WORK

Future work regarding the presence of a ninth planet beyond Neptune include the identification of more TNO's and observing location/orbital behavior. Evaluating possible TNO cluster trends may further solidify the existence of Planet Nine. Further testing with CNEOS 2014-01-08 is also required as it will provide us with additional info regarding the cause of the disturbed orbits of ETNOs.

References

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